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The Patent Office
Concept House
Cardiff Road
Newport
South Wales
NP10 8QQ

CERTIFIED COPY OF PRIORITY DOCUMENT

I, the undersigned, being an officer duly authorised in accordance with Section 74(1) and (4) of the Deregulation and Contracting Out Act 1994, to sign and issue certificates on behalf of the Comptroller-General, hereby certify that annexed hereto is a true copy of the documents as originally filed in connection with the patent application identified therein together with the Statement of inventorship and of right to grant of a Patent (Form 7/77), which was subsequently filed.

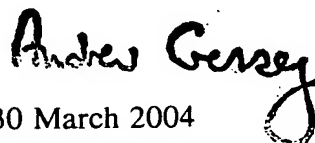
I also certify that the application is now proceeding in the name as identified herein.

In accordance with the Patents (Companies Re-registration) Rules 1982, if a company named in this certificate and any accompanying documents has re-registered under the Companies Act 1980 with the same name as that with which it was registered immediately before re-registration save for the substitution as, or inclusion as, the last part of the name of the words "public limited company" or their equivalents in Welsh, references to the name of the company in this certificate and any accompanying documents shall be treated as references to the name with which it is so re-registered.

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Signed



Dated 30 March 2004

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GB0115183.6

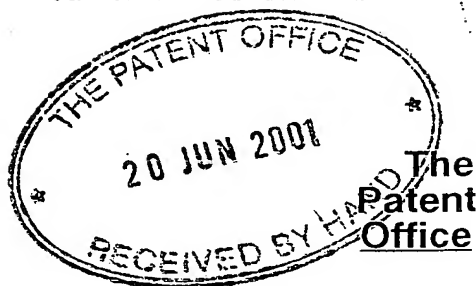
By virtue of a direction given under Section 30 of the Patents Act 1977, the application is proceeding in the name of:-

GENTECH INVESTMENT GROUP AG
Incorporated in Switzerland
Baarerstrasse 112, Treuhand-und Revisionengesellschaft Zug
6302 Zug
Switzerland

ADP No. 08361271001

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Patents Form 1/77
Patents Act 1977
(Rule 16)



21JUN01 E639142-1 D02611
P01/7700 0.00-0115183.6

Request for grant of a patent

The Patent Office
Cardiff Road
Newport
South Wales NP10 8QQ

1. Your reference
1855601/AM

2. Patent Application Number

0115183.6

3. Full name, address and postcode of the or of each applicant (*underline all surnames*)

20 JUN 2001

SECTION 50 (1977 ACT) APPLICATION FILED 15.03.02
8157471001
Sennad Technologies Limited
Harston Hall
Harston
Cambridgeshire
CB2 5GG

Patents ADP number (*if known*)

If the applicant is a corporate body, give the
country/state of its incorporation

Country: ENGLAND
State:

4. Title of the invention

NOVEL CONTROL SYSTEM

5. Name of agent

Beresford & Co

"Address for Service" in the United Kingdom
to which all correspondence should be sent

2/5 Warwick Court
High Holborn
London WC1R 5DH

Patents ADP number

1826001

6. Priority details

Country

Priority application number

Date of filing

Patents Form 1/77

7. If this application is divided or otherwise derived from an earlier UK application give details

Number of earlier application

Date of filing

8. Is a statement of inventorship and or right to grant of a patent required in support of this request?

Yes

9. Enter the number of sheets for any of the following items you are filing with this form.

0 Continuation sheets of this form

4 Description

0 Claim(s)

0 Abstract

0 Drawing(s)

10. If you are also filing any of the following, state how many against each item.

0 Priority documents

0 Translations of priority documents

1 + 2 copies Statement of inventorship and right to grant of a patent (*Patents form 7/77*)

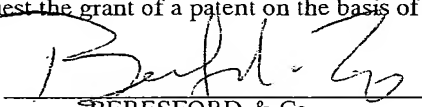
0 Request for preliminary examination and search (*Patents Form 9/77*)

0 Request for Substantive Examination (*Patents Form 10/77*)

0 Any other documents (*please specify*)

11. I/We request the grant of a patent on the basis of this application

Signature


BERESFORD & Co

Date 20 June 2001

12. Name and daytime telephone number of person to contact in the United Kingdom

DAVID SPROSTON

Tel: 020 7831 2290

Patents Form 7/77
Patents Act 1977
(Rule 15)



**Statement of inventorship and of
right to grant of a patent**

The Patent Office
Cardiff Road
Newport
South Wales NP10 8QQ

1. Your reference
1855601/AM

2. Patent Application Number
accompanying application reference 18556

0115183.6

20 JUN 2001

3. Full name of the or each applicant
Sensopad Technologies Limited

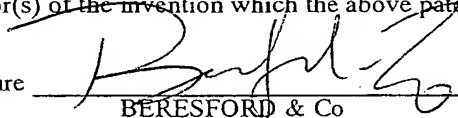
4. Title of the invention
NOVEL CONTROL SYSTEM

5. State how the applicant(s) derived the right from the inventor(s) to be granted a patent
By virtue of employment.

6. How many, if any additional Patents Forms
7/77 are attached to this form?
None

7. I/We believe that the person(s) named over the page (and on any extra copies of this form) is/are the
inventor(s) of the invention which the above patent application relates to.

Signature


BERESFORD & Co

Date 20 June 2001

8. Name and daytime telephone number of
person to contact in the United Kingdom

DAVID SPROSTON
Tel: 020 7831 2290

Patents Form 7/77

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Novel Control System

Background

There are various types of washing machines - the most common being the domestic clothes and dishwashing types. There are also, for example, industrial and special purpose washing machines for degreasing and sterilising.

For reasons of brevity and clarity the following text will only refer to domestic clothes washing machines. However it should be noted that this invention is widely applicable to a variety of appliances.

To achieve high levels of energy efficiency and performance it is necessary for washing machines to use a wash cycle optimised for both the type and amount of contents placed within them.

To maximise energy efficiency and minimise environmental impact the minimum amount of liquid washing agent, most typically water and detergent should be used to achieve adequate cleaning. This means that the amount of liquid must be measured and dosed accordingly. The liquid level in a washing machine is usually measured using the variation in pressure in a feed tube connected to the underside of the drum container. This is most often measured using piezo-resistive or similar methods and is well understood and publicised already.

To optimise the energy required for drying the wetness of the clothes must be measured. This is most often achieved by weighing the drum with dry and then wet clothes using a resistive or similar load sensor. This is already publicised and understood.

To minimise noise and vibration the vibration must be measured.

Invention

This invention teaches an alternative and novel technique for each and all of the following:

- Measuring the level of liquid in a washing machine
- Weighing washing machine drum contents (dry and wet)
- Measuring the vibration of the washing machine drum.

The first part of the invention is used to measure the level of liquid in the drum. It is shown schematically in Figure 1 below :

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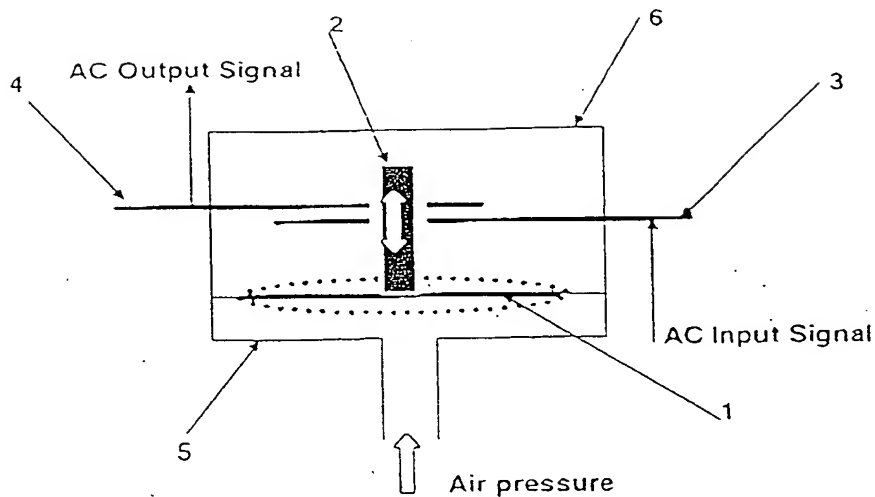


Figure 1

As the water level increases, the air pressure in the feed tube between the drum and the assembly shown in Figure 1 increases. As the pressure increases a membrane [1] (or alternatively a Bourdon type tube, bellows or similar body which provides a barrier between the atmospheric pressure and the higher internal pressure) flexes. A permeable (ferrous) element is connected to the membrane. The resulting displacement of the ferrous element [2] can be measured using an alternating current (AC) electronic circuit. The circuit is made up from three main functional elements - an input coil [3], a balanced pair of receive coils [4] and the permeable ferrous element [2]. When the ferrous element is displaced it induces a signal in the receive coils due to the change in electro-magnetic coupling. By suitably arranging the coils, the position of the ferrous element can be linearly and accurately measured. This arrangement is most advantageously produced using standard multi-layer printed circuit board techniques since this lends itself to high levels of accuracy and low costs in high volume.

The diameter of the coils and the length of the permeable (ferrite) element determine the region of linearity of the output. This is typically much greater than the PCB thickness. Small measurement resolutions in the order of microns are readily achieved.

The assembly may be contained by some mechanical housings. An input cover [5] ensures no leakage of air between the assembly and the feed tube. An output cover [6] ensures no ingress of foreign matter. The membrane is connected and secured to either or both elements.

The processing electronics for the invention will comprise means for generating, regulating, sensing and processing the signals to and from the coils. The output from the electronics will most typically be an analogue or digital signal to the washing machine's main electronic controls.

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The energy required to enable the measurement may be sent from the host or sensor control system's electronics. The detected signal may be transmitted to the host or sensor control systems electronics. In order to minimise costs the power and signal lines may be formed in to a single multi-conductor cable or a series of tracks in a printed circuit board.

The same electronics may be used for both this invention and the previously disclosed invention the 'Novel Weighing & Vibration Monitoring System' or 'Man-Machine Interface Using Relative Position Sensor' by the same authors. By sharing the same electronics the cost of the complete system is minimised. Such sharing may be achieved by the use of time division or using different frequencies in each sensor.

The **second part** of the invention is used to measure the weight and vibration of the drum. It enables a low cost, accurate and effective method of weighing clothes and sensing vibration in a washing machine.

This invention utilises the displacement of the drum relative to its supports caused by the weight of the load within the drum.

This invention is shown schematically below in Figure 2:

Displacement of the drum causes a proportional displacement of a piston [1] relative to a cylinder [4]. Such a cylinder and piston may already - but not necessarily - be present in one or more of the washing machine's vibration control and support dampers. Typically the cylinder and piston assembly is connected between a support frame (machine chassis) and the drum using fixings at either end of items 1 and 4. Such dampers or piston-cylinder assemblies may be hydraulically filled to assist in vibration control. Typically the piston's movement caused by the weight in the drum is only a few millimetres. Hence a highly accurate displacement measuring technique is required in order to provide adequate levels of load measurement resolution. Also, given that the damper is often operating in a vibrating, hot, humid environment for long periods a highly reliable, preferably non-contact, sensing system is required.

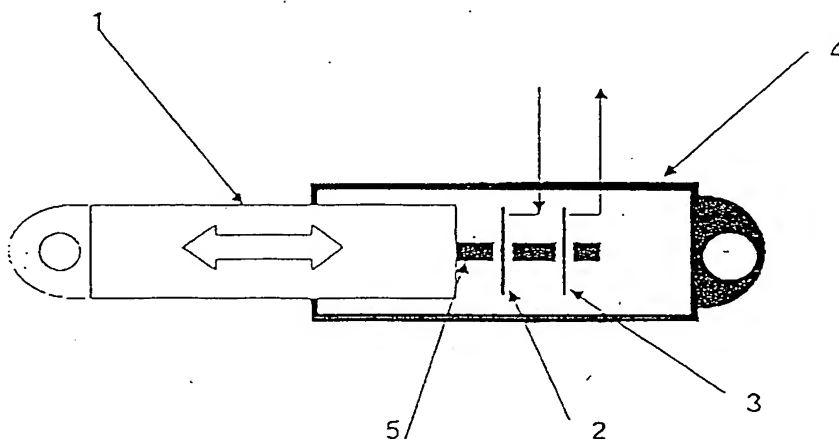


Figure 2

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In this invention a permeable (ferrous) element [5] is attached to either the piston or the cylinder. A similar arrangement of coils is embodied within or around the cylinder as described in the first part of the invention.

The energy required to enable the measurement may be sent from the host control system's electronics. The detected signal may be transmitted to the host control system's electronics. In order to minimise costs the power and signal lines may be formed in to a single multi-conductor cable or a series of tracks in a printed circuit board.

Since the coils are most likely to be embodied as printed circuit board tracks then it can be seen by those skilled in the art that highly accurate placement of the tracks is possible and hence highly accurate readings also possible.

This technique operates at high frequencies relative to typical washing machine vibrational frequencies. Therefore, it may be seen by those skilled in the art, that measurement of vibrational frequency and amplitude is relatively straightforward. As such the system's control electronics may subsequently provide input for vibrational controls outputs - for example, increasing the damping forces. In extreme instances of an unbalanced load causing gross vibrations, the spinning drum may be stopped and then slowly rotated so as to optimise the position or speed of the load.

The same electronics may be used for both parts of this invention. By sharing the same electronics the cost of the complete system is minimised. The use of time division or using different frequencies in each sensor may achieve such sharing.

The same measurement principle may also be used in the washing machine's control panel as a substitute for traditional electro-magnetic buttons or switches. In such instances the ferrite is displaced relative to the coils as an operator actuates a button element. Such a technique advantageously replaces the electrical contacts and wearing parts that are often problematic in typical washing machine environments.

Since the contents of the washing machine may be measured when wet and dry, and the level of water in the drum measured, then it can be seen that such information may be used in fuzzy or similar logic controls to optimise the wash and dry cycle.

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